



### National workshop:

Generating climate change and disasters indicators for policy decision-making in Saint Vincent and The Grenadines

27, 28 and 29 June 2022

# The geospatial dimension of environment, climate change and disaster statistics and indicators

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# Content

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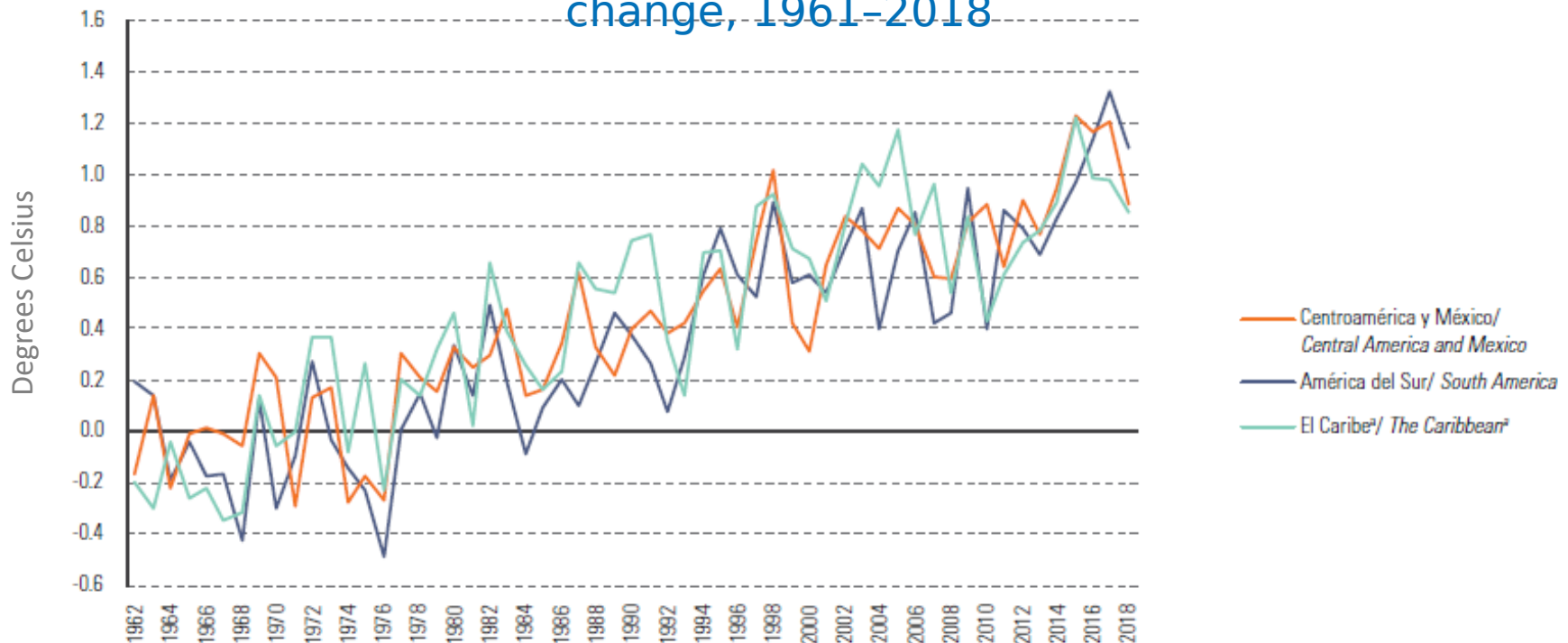


# Introduction

## Climate change: A permanent concern

- Latin America and the Caribbean region is especially vulnerable to climate change due to its geographical and climatic situation, socio-economic characteristics, and the high sensitivity of its natural assets (ECLAC, 2015).

### Latin America and the Caribbean: mean annual temperature change, 1961-2018



<sup>[A]</sup> FAO, Base de datos estadísticos (FAOSTAT) [en línea] <http://www.fao.org/faostat/es/#home>.

<sup>a</sup> Incluye Cuba y la República Dominicana.

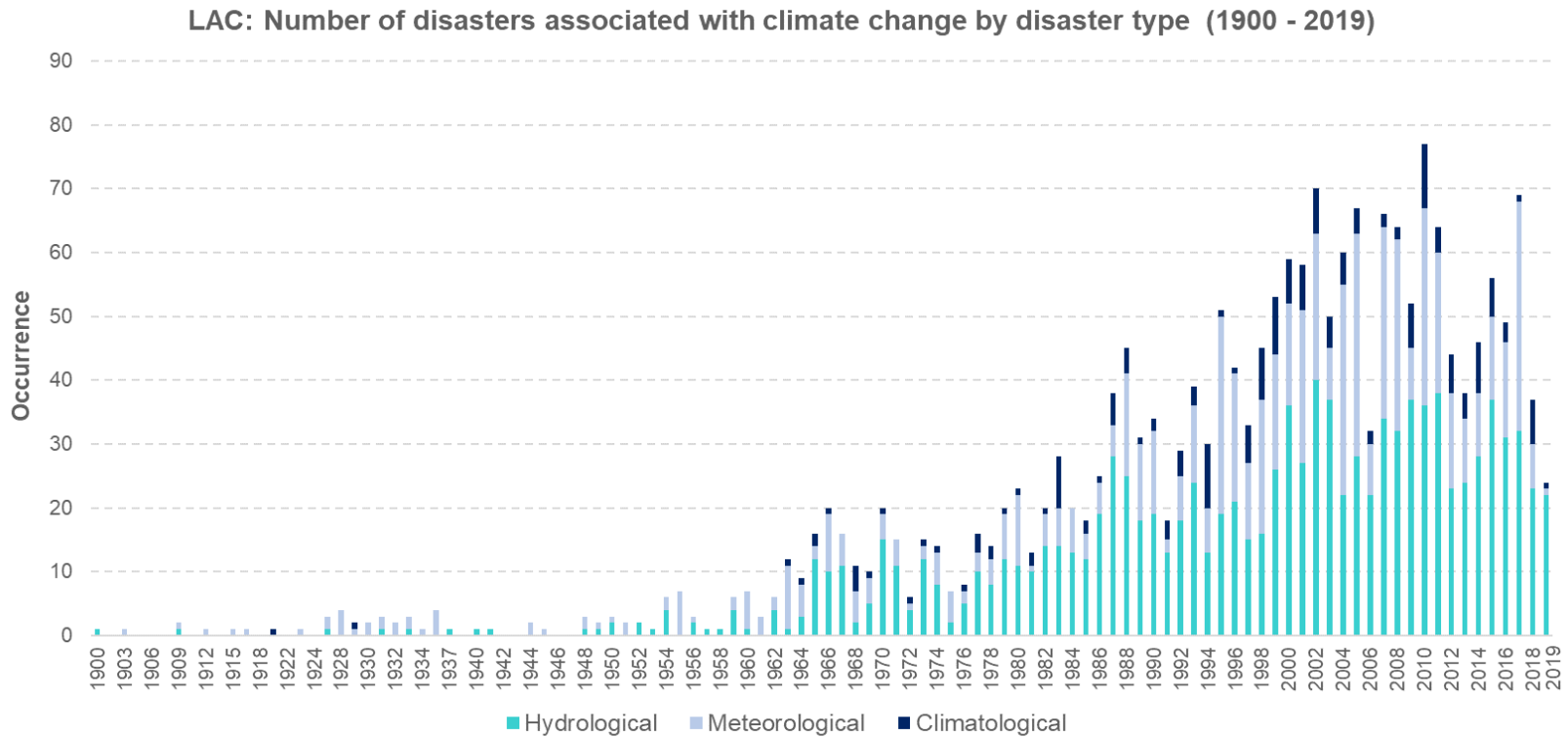
<sup>[A]</sup> FAO, Database for Statistical Data (FAOSTAT) [online] <http://www.fao.org/faostat/en/#home>.

<sup>a</sup> Includes Cuba and the Dominican Republic.

# Introduction

## Climate change: Impacts and risks

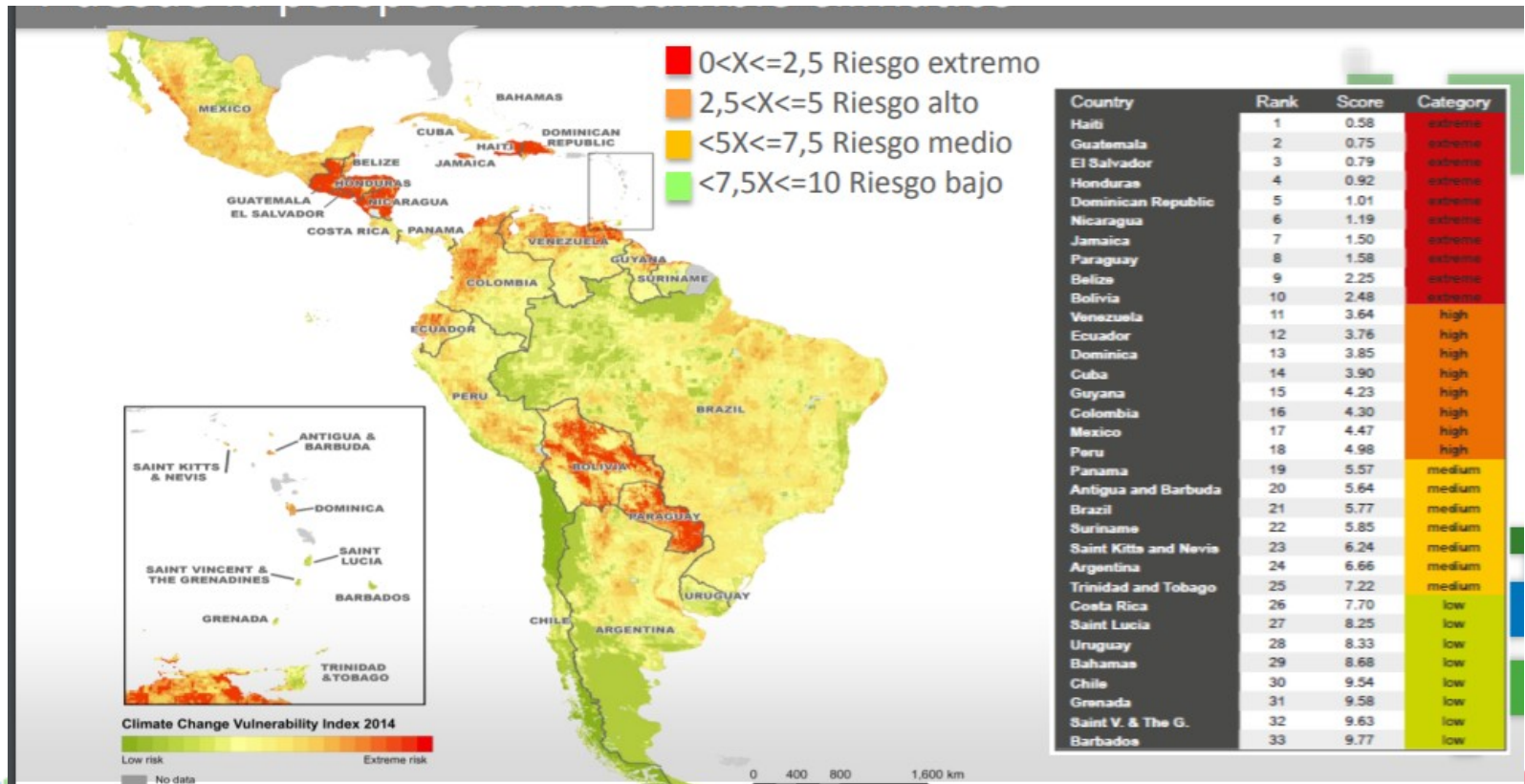
- Evidence of the impacts of climate change in LAC shows that these effects are already significant and, with a high probability, will be more intense in the future (IPCC, 2013).



# Introduction

## Climate Vulnerability index in LAC (CAF, 2014)

- Assesses the vulnerability of human populations to extreme weather-related events and changes over the next 30 years.
- Combines the risk of exposure to climate change and extreme events with the human sensitivity to that exposure and the country's ability to adapt to climate change or take advantage of those changes' impacts.



# The geospatial dimension of environment statistics

- The phenomena captured through the environment statistics occur on the earth's surface
- Phenomena happen in geographical spaces that do not always coincide with administrative limits
- They present gradients that go from a planetary to a local scales



## The importance of where

When looking at a map, we start turning that map into information by analyzing its content —finding patterns, assessing trends and making decisions. This process is called “spatial analysis.”

Using spatial analysis, you can combine information from many independent sources and derive new sets of information. And by employing time series, you can detect changes over time.



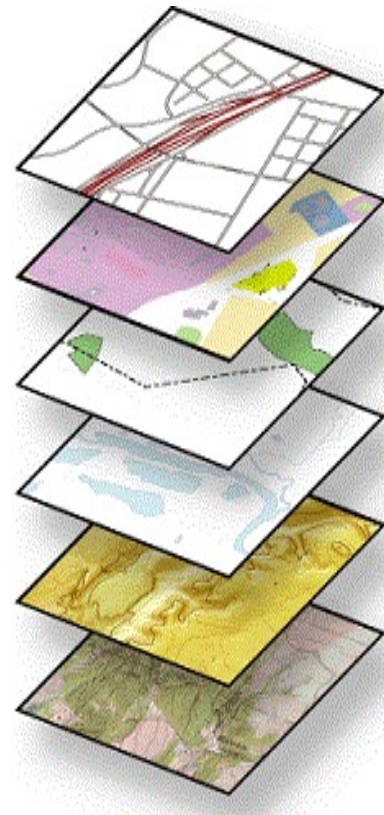
# Georeferencing

- *Geographic shapes - lines, points, polygons. Georeferencing is an attribute of the data.*
- *The integration of databases (layers) in a Geographic Information System (GIS) implies the precise location of the objects / entities*



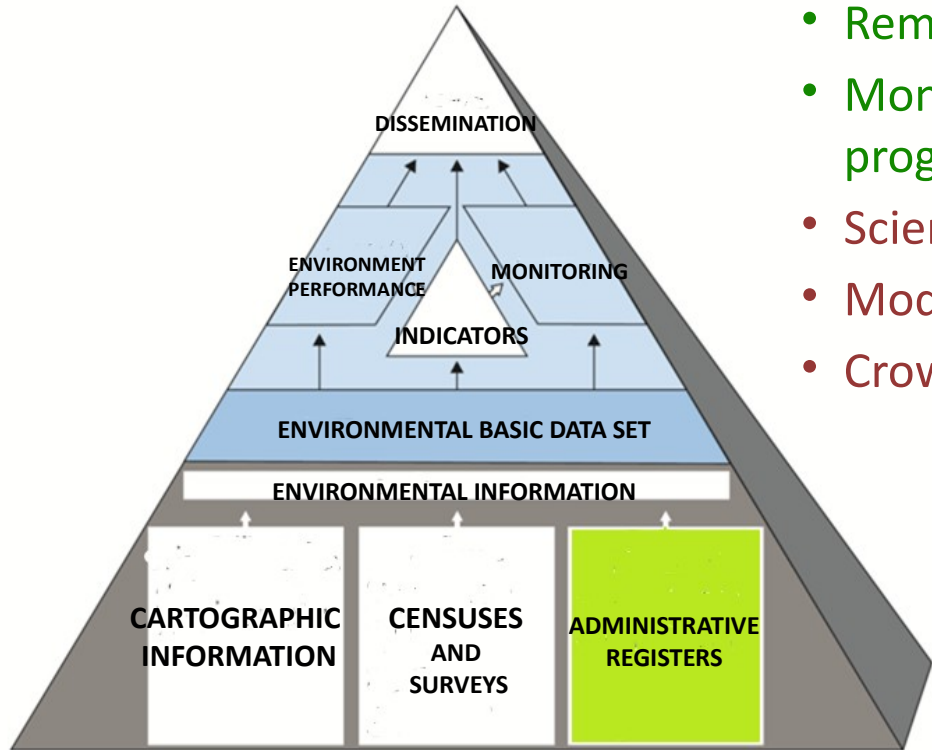


- The possibility of overlay and correlate different layers of GIS data allows spatial relationships with other entities (topology) and temporal patterns.
- It is also possible to perform calculations, **build indicators**, analyze distributions, prepare thematic maps, and obtain new variables.



# Data/information sources

- Cartography
- Census and surveys
- Administrative records
- Remote sensing
- Monitoring stations and field monitoring programs
- Scientific research
- Modelling and Estimation
- Crowd sourcing

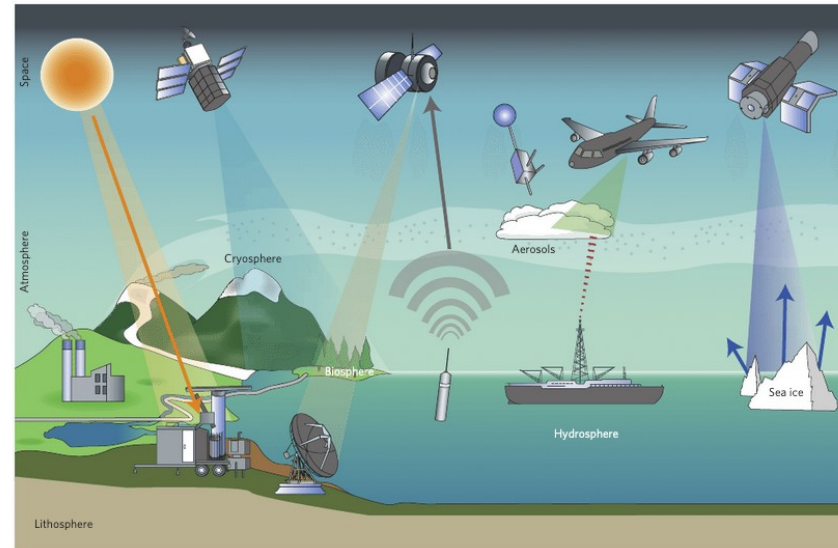


# Data sources and georeferencing

- In censuses and surveys, the use of mobile capture devices (tablets or similar) with global positioning capacities (GPS) allows the georeferencing of units through the geographic location of a point, line, or polygon, in these dwellings, economic establishments or agricultural holdings, during the same data collection process.



- Remote sensing offers a broad spectrum of geo-referenced environmental data that provides a synoptic view of the different components of the environment.
- Data is obtained in digital format from instruments that measure the electromagnetic response of the different elements over the earth's surface.
- These data are subject to be processed applying classification techniques supported by field validations



## NASA products

### Product Gallery Hurricane Dorian

- Event Specific Products
- Relevant Near Real-Time Products and Dashboards
- Story Map

DISASTERS NASA Products for Hurricane Dorian 2019 Search

Hurricane Dorian 2019

ARIA Flood Proxy Map (Copernicus Sentinel-1) on 9/4/19 for Hurricane Dorian

ARIA Damage Proxy Map (Copernicus Sentinel-1) on 9/2/19 for Hurricane Dorian

ARIA Damage Proxy Map (Copernicus Sentinel-1) on 9/4/19 for Hurricane Dorian

ARIA Flood Proxy Map (Copernicus Sentinel-1) on 9/2/19 for Hurricane Dorian

Near Real-Time Products: Tropical Cyclones

Near Real-Time Products for Tropical Cyclones

Total Rainfall (GPM) from 8/30/19 to 9/4/19 for Hurricane Dorian

RGB Composite Imagery (Copernicus Sentinel-1) for Hurricane Dorian

True Color Imagery (Copernicus Sentinel-2) for Hurricane Dorian

Natural Color Imagery (Copernicus Sentinel-2) for Hurricane Dorian

True Color Imagery (Landsat 8) for Hurricane Dorian

Panchromatic Band Imagery (Landsat 8) for Hurricane Dorian

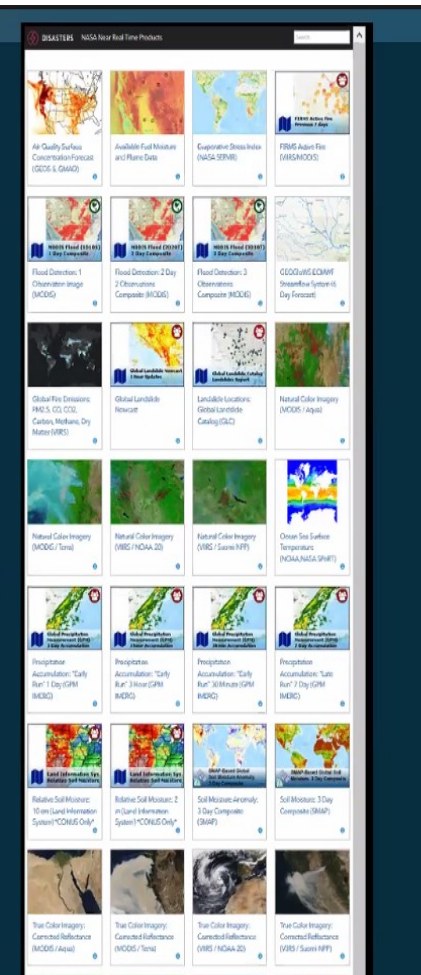
Natural Color Imagery (Landsat 8) for Hurricane Dorian

Day Night Band Imagery (VIIRS) for Hurricane Dorian (mosaic)

## NASA products

### Near Real-Time Products

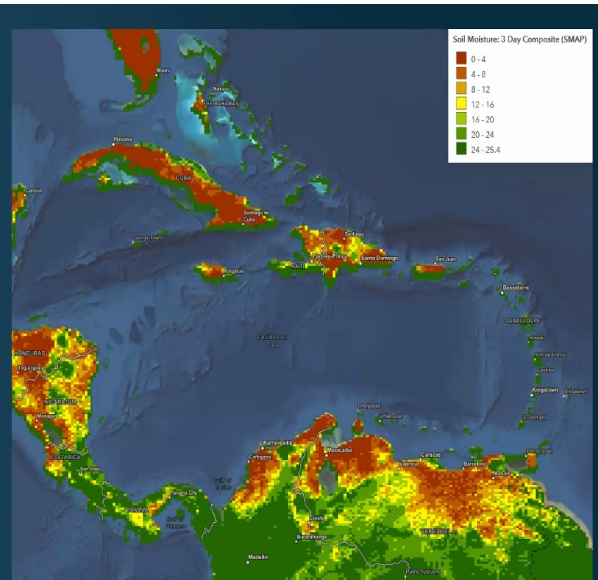
- Global unless noted otherwise
- Coarser resolution
- Automatically updated every few hours to daily or weekly
- Many products for the Caribbean
  - Black Marble Nighttime Blue/Yellow Composite
  - FIRMS Active Fire Points (MODIS, VIIRS)
  - Global Landslide Nowcast
  - Flood Detection – 2, 3 Observations (MODIS)
  - Precipitation Accumulation – 30 min, 3 hour, 1 day (GPM IMERG)
  - Soil Moisture and Soil Moisture Anomaly – 3-Day Composite (SMAP)
  - Evaporative Stress Index – weekly
  - Global Fire Emissions – Daily (VIIRS)
  - True Color Imagery – Daily (MODIS at 250m, VIIRS at 375m)
  - Natural Color Imagery – Daily (MODIS at 250m, VIIRS at 375m)



# Data/information sources

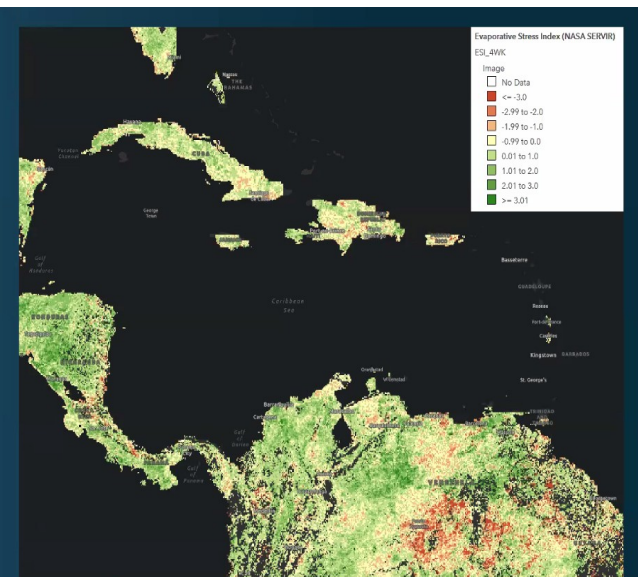
## Soil Moisture

- Soil Moisture Active Passive (SMAP) derived product
- 3-Day Composite
- 25.4mm = saturated
  - Red = dry
  - Green = wet
- Resolution: .25°
  - Best for larger Countries



## Evaporative Stress Index

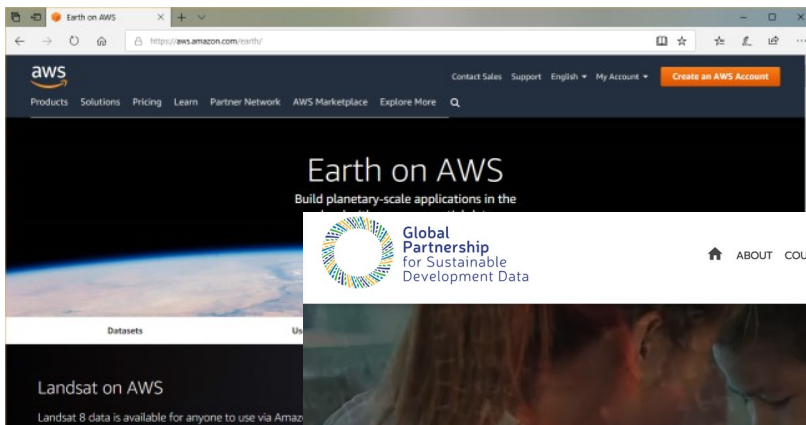
- Weekly product
- Yellow to Red = Dry, stressed vegetation
- Latency = ~2 weeks
- Resolution: 5km



## Data availability through other platforms

### Amazon Web Services:

<https://aws.amazon.com/earth/>

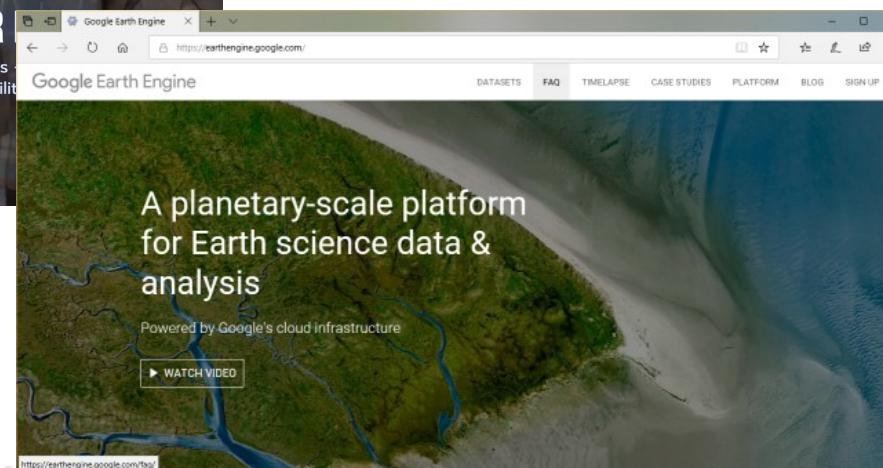


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<http://www.data4sdgs.org/>

### Google Earth Engine <https://earthengine.google.com/>



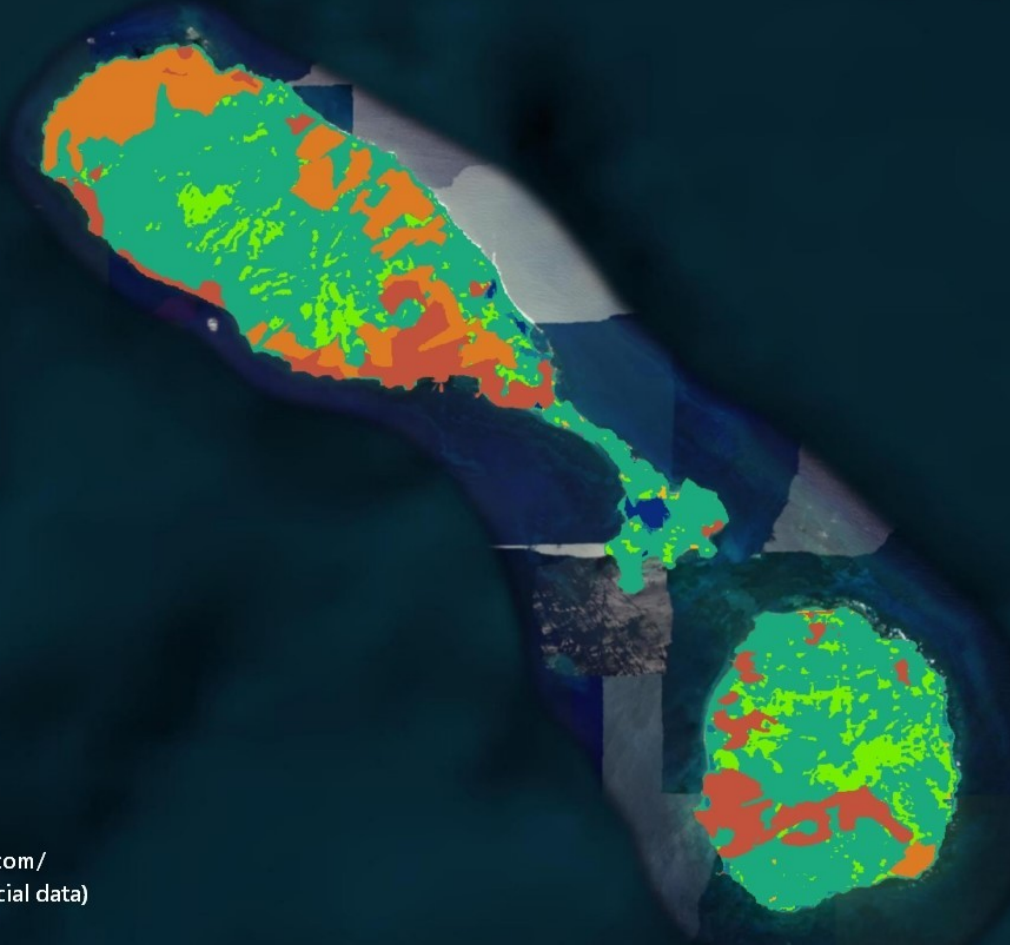


# GlobeLand30

GlobeLand30, the 30-meter resolution global land cover data product, was developed by the Ministry of Natural Resources from China.

The availability is for: 2000, 2010 and 2020.

Landcover Class	
Artificial Surfaces	Red
Cultivated land	Orange
Bare Land	Yellow
Permanent snow and ice	Light Green
Grassland	Green
Shrubland	Dark Green
Forest	Teal
Wetland	Blue
Water bodies	Dark Blue



Saint Kitts and Nevis

2020

ECLAC. SD. ESU.

Data Source: <http://www.globallandcover.com/>

Note: GlobeLand30 data example (not official data)

# Conclusion

Location intelligence is the ability to analyze and find spatial patterns in data to provide powerful insights for understanding our world and communicating our needs.

This is possible through a combination of local data and advanced geospatial tools.







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**Thank you for your attention!**

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